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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Katsuyoshi MATSUURA, et al.

Serial No.

Filed: April 17, 2000

Title: SEMICONDUCTOR DEVICE HAVING A FERROELECTRIC CAPACITOR AND A FABRICATION PROCESS THEREOF

Examiner:

Art Unit:

INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Pursuant to 37 C.F.R. § 1.97, the Examiner may wish to consider the references listed on the attached PTO Form 1449. In submitting these references, no representation is made or implied that the references are or are not material to the examination of this application. The Examiner is encouraged to make his or her own determination of materiality.

Copies of the references are provided. However, each of the references is in Japanese. Brief descriptions, in English, about each of the references follow:

Publication No. 09321234 entitled FERROELECTRIC THIN FILM DEVICE, MANUFACTURE THEREOF AND FERROELECTRIC MEMORY DEVICES teaches a ferroelectric thin film device, a manufacturing method thereof and a ferroelectric memory device, enabling low temperature film forming with reduced leak current. The method of manufacturing a ferroelectric thin film device having a lower electrode layer, a ferroelectric thin film and upper electrode layer successively laminated on a substrate includes the steps of forming an oxide thin film to be the ferroelectric thin film on the lower electrode layer formed on the substrate by the physical or chemical vapor

deposition, forming the upper electrode layer on this oxide tin film, and heating it to form the ferroelectric thin film in a pressure gas atmosphere of less than 1atm. in a heat treating step.

Publication No. 10294433 entitled MANUFACTURE OF FERROELECTRIC MEMORY ELEMENT teaches a technique in which after a Pt lower electrode is formed, an $SrBi_2Ta_2O_9$ (SBT) film is formed on the electrode as a ferroelectric thin film. Then, the electrode is worked and the SBT film is crystallized through heat treatment. After the film is crystallized, the film electrode and a TiN barrier metal layer are worked to prescribed sizes. Then, a Ta_2O_5 barrier insulating film is deposited by using the well-know sputtering method and a contact hole is formed above the SBT film. Thereafter, an Al plate line is formed by forming an Al film and working the Al film by using the well-known photolithography method and dry etching method and the interfaces of the electrodes are stabilized through heat treatment.

Publication No. 10321809 entitled SEMI-CONDUCTOR STORAGE ELEMENT MANUFACTURING METHOD teaches a ferroelectric film of a dense crystal structure, capable of forming a ferroelectric film of dense crystal structure on the surface of a lower electrode, even in a Bi-layered structure compound, in which coarsened crystal grains are easily generated by separating crystallization steps into a plurality of stages. More particularly, Ti adhesive layer and then a lower Pt electrode are formed on a silicon substrate having a silicon oxide film formed by thermal oxidation. Next, on the lower Pt electrode, a layer of a MOD solution of $SrBi_2Ta_2O_9$ is coated. After having been subjected to a dry step, the $SrBi_2Ta_2O_9$ film is crystallized by a heat treatment at a substrate temperature of 600°C under a reduced pressure and oxygen atmosphere. Thereafter, coating and drying steps are repeatedly conducted three times on the $SrBi_2Ta_2O_9$ film to provide the $SrBi_2Ta_2O_9$ film with a desired film thickness by the MOD method and to turn the film into an amorphous or microcrystal state by heat treatment. After an upper Pt electrode is formed on the $SrBi_2Ta_2O_9$ film the heat treatment is conducted at a substrate temperature of 600°C under a reduced pressure and oxygen atmosphere.

This IDS is filed prior to the first office action in the present case. Accordingly, no fee is believed due.

Respectfully submitted,

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